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16 October 1991

EG&G, Rocky Flats
P.O. Box 464
Golden, CO 80402-0464

ATTN: Jim Kofer

Subject: French Drain Geotechnical Investigation
OSHA Requirements for Explanations
Roy F. Weston, Inc. (WESTON) Work Order No. 2029-33-09

Dear Mr. Kofer:

WESTON has prepared the following response to your inquiry regarding the slope designs presented in the above-referenced document, and the applicable Occupational Health and Safety Administration (OSHA) regulations. The regulation governing excavations are presented in 29 CFR 1926.650, as amended on 31 October 1989 and published in Volume 57, No. 209 of the *Federal Register*. This document defines four options regarding the design of excavations. Options 1 and 2 are applicable for excavations of less than 20 feet in depth. The options as defined in Subpart P of the above-referenced document are excerpted below.

(1) *Option (1)—Allowable configurations and slopes.* (i) Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

(2) *Option (2)—Determination of slopes and configurations using Appendices A and B.* Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in Appendices A and B to this subpart.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of sloping or benching systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(4) *Option (4)—Design by a registered professional engineer.* (i) Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under paragraph (b) of this section shall be approved by a registered professional engineer.

Because the French Drain requires, at times, construction in excess of 20 feet in depth and potential localized slope instability, WESTON chose to utilize Option 4 (design approved by registered professional engineer). WESTON's slope specifications are identified in the French Drain Geotechnical Investigation Report. WESTON strongly recommends that all affected parties read and become familiar with the report for specific slope requirements. It is WESTON's recommendation and OSHA requirement that a copy of this letter and the geotechnical report be maintained and available at the job site.



OSHA also requires that, during excavation projects, specific worker protection procedures need to be in place. These procedures are presented in 29 CFR 1926.651 General Requirements. Included in the General Requirements are the following paragraphs that are particularly relevant to construction of the French Drain.

(h) *Protection from hazards associated with water accumulation.* (1) Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

(2) If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

(3) If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with paragraphs (h)(1) and (h)(2) of this section.

(k) *Inspections.* (1) Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

WESTON can provide daily inspections for EG&G during construction of the French Drain. This work can be performed under our current contract without securing additional funding. Please let me know if you desire WESTON's continued assistance on this project.

Should you have any questions regarding this letter, please feel free to contact Greg Sherman or me.

Sincerely,

ROY F. WESTON, INC.

A handwritten signature in cursive script that reads "Michael A. Anderson".

Michael A. Anderson, Ph.D., P.E.
Vice President

MAA/mf

cc: G. Sherman
Project File